TRANSBOUNDARY GAS GROUP

GENERAL MEETING NOTES

February 18, 1999
Seattle, Washington

1. Greetings, Introductions and Review of the Agenda.

Mark Schneider of the National Marine Fisheries Service and Bev Raymond of Environment Canada, co-chairs of the Transboundary Gas Group, welcomed everyone to today's meeting of the Transboundary Gas Group, held on February 18, 1999 at the Corps of Engineers offices in Seattle, Washington. Schneider and Raymond led a round of introductions, then a review of today's agenda.

The following is a summary (not a verbatim transcript) of the meeting Some documents distributed at the meeting may be too lengthy to routinely attach to the minutes; please contact Schneider at 503/231-2306 to obtain copies of any of the enclosures referenced in these meeting notes.

2. Report on EPA's Federal-State Clean Water Act Discussions.

Mary Lou Soscia of U.S. EPA said her agency continues to be involved in technical-level and policy-level discussions on how the Clean Water Act standards for both temperature and dissolved gas can be met in the Columbia River system. EPA is in discussions with both state water quality agencies and the federal project operators to develop compliance strategies. Soscia said there is a general recognition that the CWA's dissolved gas standard will be easier to attain than the temperature standard; however, EPA would like to make progress on temperature compliance issues as well. A meeting with the federal operators to discuss these issues is set for April 6; prior to that meeting, EPA will be sending a letter to the federal operators requesting their thoughts on how a compliance strategy might be developed.

EPA has also been working on a Lower Columbia temperature model, Soscia continued; that model is currently being peer-reviewed. As soon as the temperature model is completed, EPA intends to start work on a dissolved gas model that incorporating the Upper Columbia reach.

Larry Fidler questioned Soscia about the potential duplication of effort between the EPA modeling work and that already completed by the Corps; Soscia replied that the EPA has worked closely with the Corps to ensure that the EPA models compliment, but do not duplicate, work already done by the Corps. In response to another question, Soscia said EPA modeler John Yearsley will contact Marshall Richmond to discuss the structure and methodology to be used in

the EPA models. Raymond said a more detailed discussion of modeling will take place later in today's agenda.

3. Status of the Proposed U.S. Regional Water Quality Team – Update.

Soscia provided an overview of the proposed merger of the NMFS Dissolved Gas Team (DGT) with the EPA Water Temperature Group into a single entity, the Regional Water Quality Team, to address both temperature and gas issues. She described the structure and duties of the two teams to be merged, then said that, given the obvious interconnections between temperature and gas, the idea of a water quality team to address both issues has received strong support from many of the participants in the NMFS Regional Forum process, including the Dissolved Gas Team. Soscia said the temperature team will meet next on February 23, and will discuss the proposed merger at that meeting; if the group is supportive of the idea, the merger will go to the Implementation Team for approval.

Soscia added that, if the merger is approved, the new Regional Water Quality Team would be a good forum for coordination and information exchange with the Transboundary Gas Group effort. Schneider and Jim Ruff agreed, saying this proposed merger offers a rare opportunity to streamline the Regional Forum process, and to raise the profile of water quality issues in the salmon recovery effort. Schneider added that the next DGT meeting is scheduled for March 2; the next IT meeting, at which the proposed merger will be discussed and, potentially, approved, will be held March 4. Both meetings will be held at NMFS' Portland offices; Schneider invited any of the TGG participants who are interested to attend or call into these meetings.

4. Keenleyside Dam TGP Issues – Update.

Fidler distributed Enclosure A, a report on the status of B.C. Hydro's efforts to address gas supersaturation production at Keenleyside Dam. He spent a few minutes going through this information; please see Enclosure A for details of the Keenleyside gas abatement effort.

The group devoted a brief discussion to this information; Fidler added that there has been a great deal of discussion about the possibility of adding yet another turbine unit to the Keenleyside power plant, in an effort to reduce dissolved gas production further. The cost and scheduling, unfortunately, became impossible. However, the idea of installing flow deflectors to the Keenleyside spillway has a lot of merit, Fidler said – it would be much less expensive than an additional turbine, and could potentially be extremely effective. Once the two-turbine powerplant that is currently being installed by Columbia Power at Keenleyside is operational, there will be a significant reduction in dissolved gas production at that project, said Fidler. If we also install flow deflectors on the spillway, it should be possible to achieve the 110% TDG/TGP guideline at a cost of less than $1 million. The installation of flow deflectors at Brilliant and Waneta Dams could have a further, significant effect on dissolved gas production in the Upper Columbia system. Given the fact that flow deflectors could be installed at all three dams for less than $2 million, Fidler said, that would be a tremendous bargain, and one this group may want to recommend. And that is one of the main functions of the Transboundary Gas Group, said Ruff – to identify the most effective, least-cost gas abatement solutions.

In response to a question from BPA's Tom Foeller, Fidler said he is unsure whether B.C. Hydro is actively pursuing the installation of flow deflectors at these projects; B.C. Hydro have said that they are prepared to look at further gas abatement techniques, such as flip-lip installation, but the status of that investigation isn't known at this time.

5. Review and Discussion of Draft Systemwide Gas Abatement Study Plan.

Ruff provided an introduction to this agenda item; he thanked each of the work groups for the considerable time, effort and energy they have put into developing their chapters of the Study Plan; in particular, he thanked the Corps for making the entire study plan available on their Internet homepage. Ruff then asked Chris Pinney to lead off this section with a presentation on the Biological Effects and Research chapter.

A. Biological Effects and Research Work Group. Pinney worked from a series of overheads, attached as Enclosure B; please refer to this document for details of Pinney's presentation. He said the Biological Effects and Research subgroup has developed three work products: a draft briefing paper, titled "Biological Effects of Total Gas Pressure on Fish and Aquatic Biota and Outstanding Research Needs," a bibliography, which is not yet finished, and a cost estimate for the development of a detailed research plan.

Pinney explained that the briefing paper is in draft form; it is an overview paper, not a detailed research plan; its focus is wild fish, not hatchery or aquaculture environments. The purpose of the paper is to "Conduct a short review of the current knowledge of the biological affects of DGS on anadromous and resident fish species, identify research that is needed to fill existing knowledge gaps, and identify new TGP/GBT predictive capabilities. A comprehensive research plan will be developed in the future as a separate document."

Pinney touched on the structure and premises included in the draft briefing paper, the potential uses of biological effects information and research, some of the uncertainties related to the biological effects of dissolved gas supersaturation, and some of the specific areas where further GBT-related biological research is needed; please see Enclosure B for details.

In response to a question, Pinney said the work group had not addressed physical injury to fish caused by structural gas abatement alternatives in their report. Ruff suggested that it would probably be useful if such a section could be added. He added that delayed mortality associated with passage through the hydrosystem is probably the main uncertainty facing the salmon recovery effort; I hope and believe that is a research question that will be taken up by the region in the near future, Ruff said.

Pinney answered a few additional questions about the details of the biological effects and research briefing paper; the group then moved on to the next element of this agenda item.

B. Monitoring and Information Sharing Work Group. Faith Ruffing provided an overview of the Monitoring and Information Sharing chapter of the study plan. She said there is

still a lot of information to be gathered for this segment of the study plan; however, I think we have at least a framework to show us where we're going, Ruffing said.

At the last meeting of this group, the Monitoring and Information Sharing work group was assigned several tasks, Ruffing continued. Some of those are now done; others are not. The first task was to put together an inventory of all of the projects in the Columbia River basin, and all of the physical monitoring work that has been done at those projects. We were also asked to work with the modeling work group to determine the quality of the data that has been collected, and the quality of the data needed for the modeling effort, she said. The work group was also asked to develop a list of key physical monitoring data needs, as well as a list of TDG hot spots.

Ruffing said the group had used the Corp's "Pacific Northwest Reservoir System" map to develop its basic list of 125 dams in the system. There are some additional projects not shown on this map, she said, but finding a map that shows every dam and reservoir in the system is not an easy task. Ruff observed that such a map needs to be developed for the study plan.

The Corps' map was used by the work group to develop two tables, Ruffing continued. The first is simply a list of projects, their purpose, location and contact persons at each dam. The second table takes the same list and provides information on the monitoring data and reports that have been developed for each project. She asked any TGG participants who know of additional studies and monitoring work not included on the current list to contact her with this information.

On the modeling front, Ruffing said the group had talked to Marshall Richmond and others about modeling information needs; basically, what they told us was that, to put a project into the model, at least one year of forebay/tailwater monitoring data is needed, she said. You might be able to get by on less data, Richmond said, but obviously, more is better.

Identifying the key data needs and dissolved gas hot spots was a somewhat more difficult task, Ruffing continued, primarily because of the sheer number of dams in the system. Some of those aren't really a concern, from a dissolved gas standpoint, because of their location and how they're operated. Other dams are more problematic, and further study is needed to determine whether they are producing dissolved gas, at what levels and under what conditions, Ruffing said. That study will help to determine which dams need further monitoring and evaluation; once that data is collected, we should be able to identify some additional TDG hot spots. However, until that work is done, it is difficult to say which dams need basic studies, which may need full-blown monitoring programs, and which projects need to be included in the modeling work. Ruffing added that, to finish this section of the study plan, at least some additional funds will be required.

Ruff and Schneider reiterated that, if any of the other TGG participants have information about gas-producing projects in the system, they should provide that information to Ruffing. Fidler made the point that the group needs to be careful in its use of the term "hot spot;" we could see gas levels of 140% at a given location, he said, but if the fish are only exposed for half an hour, the biological effects are minimal.

Ruffing went on to say that, in terms of the future work of the Monitoring and Information Sharing work group, there is a need for a review of the physical data to develop a succinct summary of the data collected to date. Once we know what we've learned, she said, we will be able to identify the data gaps that need to be filled; we should also be able to develop the list of TDG hot spots. Out of that can be developed a long-term plan of action, detailing areas where further model work, monitoring and special studies are needed. At that point, she said, we'll also have a better idea of what all of this will cost.

Ruff said that, on the subject of which projects need to be included in the Monitoring and Information Sharing database, it would probably be a good idea to develop criteria, which the TGG can agree on as a group, for which projects are selected for inclusion in the study. Obviously, he said, what we're looking for is the projects that are producing gas, no matter where they are, and regardless of whether they have effects on fish or not. We need to know which projects are producing high levels of gas, he said; that means that, as a group, we need to come to agreement on what constitutes a high level of gas. Ruff suggested that it may be appropriate for the work group to develop a recommendation on that point, and bring it back to the full group for discussion.

In response to a question from Les Swain, Ruff said it may be possible to overlay information on the habitat inhabited or traversed by the various threatened and endangered species in the basin on the project map that will be included in the study plan, using information from the StreamNet database. That may be helpful, in showing how the presence of these fish species coincides with the location of gas-producing projects in the system, he said.

C. Modeling Work Group. Marshall Richmond said that, at the last meeting, he had provided an overview of some of the key elements and issues associated with the application of a dissolved gas transport model in the basin. Since that meeting, he said, we have been attempting to flesh our chapter of the study plan; a draft of the Modeling chapter is now available on the Corps' Internet homepage.

In general, said Richmond, there is a need for further discussion of the goal of this particular piece of work, as well as what we might like its long-term utility should be. One of the things the work group has done is summarize some of the types of models that might be useful for this kind of work; Richmond went through some of the technical specifics of the various model designs summarized in the Modeling section of the work plan. He said that, again, the better the physical information that is available, the better the analysis will be; however, having somewhat less information for a given project doesn't necessarily mean you're dead in the water. The key data, in terms of dissolved gas modeling, is the dissolved gas production relationships at the various projects, because whatever the models simulate is ultimately driven by whatever input is used for the uncertainties related to dissolved gas productions.

On the project operations side, key data needs identified by the Modeling work group include spillway flow to turbine flow and forebay and tailrace elevations. This information is readily available for many projects, Richmond said, particularly for Corps projects. To look at air-water gas exchange, we need reservoir-specific meteorology, he continued; this data is

somewhat more difficult to obtain. One key area where more research is needed is the development of mechanistic gas production models for each of the gas-producing projects, he added.

If it is not feasible to develop these mechanistic gas production models, Richmond said, then it will be necessary to develop some sort of statistical approach; the Waterways Experiment Station has done some pretty good work in terms of using the monitoring information and physically-based criteria to develop its statistically-based models. Parameterizing air/water gas exchange is another key issue, especially for the lower pools, Richmond said. He added that, because of the complex suite of factors that influence actual gas production at some projects, such as Lower Granite, some additional field investigations may be necessary to develop a truly accurate dissolved gas transport model.

Richmond touched on the level of effort that will be required to develop gas transport models of various levels of complexity. Developing a basic tool, using existing data sources, will require the services of two full-time modelers for approximately one year. To develop a more sophisticated model, capable of extensive alternatives analysis, will require considerably more effort, Richmond said.

The group spent a few minutes discussing the various models available for use in this effort, and their input requirements. Fidler added that it is extremely important that a tool be developed that can look at the effects of gas bubble trauma on adults; that is something that hasn't been looked at to any extent at all, he said, and it is a major part of the problem – we may be getting some adult returns, but if they're killed by GBT before they can spawn, then the recovery effort will not succeed.

D. Structural and Operational Abatement Work Group. Keith Binkley of Seattle City Light distributed the most recent version of the Structural and Operational Abatement chapter of the study plan (Enclosure C); he stressed that this document is definitely a work in progress. Binkley said that, working from a different map than that used by Faith Ruffing and the Monitoring and Information Sharing work group, the Structural and Operational team has identified 41 major dams in the Northwest.

Binkley said the Structural and Operational Abatement work group had broken these 41 major projects into eight reaches: the Lower Columbia, Mid-Columbia and Upper Columbia, the Snake River, Pend Oreille River, Kootenay, Clark Fork and Flathead. The group then contacted the managers of each of the projects directly to ask what structural and operational programs they had in place to abate gas.

Binkley referred the meeting participants to Enclosure C, which details the various structural and operational gas abatement alternatives implemented or under consideration at the Corps of Engineers projects in the Columbia and Snake Rivers and at projects in the Mid-Columbia, the Pend Oreille River, the Clark Fork system, the Flathead River, the Upper Columbia and the Kootenay River (please see Enclosure C for project-by-project details). The

intent of this inventory is simply to give everyone an idea of what is going on, in terms of implemented or proposed gas abatement measures at the major projects in the Columbia Basin, Binkley said, adding that there are still a number of projects, such as those operated by Montana Power, for which information is needed.

Binkley noted that expanding this list of projects to match the list developed by the Monitoring and Information Sharing work group will be a very large effort; some further guidance is needed from the TGG as a whole, to determine which dams and reservoirs are the projects of concern, from an analytical priority standpoint. He added that Enclosure C also includes a list of generic, non-site-specific short-term and long-term structural and operational gas abatement alternatives, items that have already been implemented at some dams and others that are being contemplated at this time.

Moving on, Binkley said the work group has recommended a number of actions to be included in the systemwide dissolved gas abatement study plan:

- Identify data gaps – data gaps need to be identified by mid-1999; a plan to address these data gaps needs to be in place soon after.
- Proceed with systemwide monitoring by 2000 – the level of monitoring effort varies across the basin; complete basin coverage and consistency in effort are necessary for a calibrated model.
- Statistical evaluation – a site-by-site evaluation of hydraulic conditions is fundamental to determining the frequency and magnitude of spill conditions and assessing a project's propensity to produce elevated levels of TDG.
- Identify problem areas – hot spots need to be identified by early 2000.
- Conduct and complete operational tests – operators need to assess and determine spill operations that minimize gas production and define gas production relationships.
- Modeling – modeling represents a critical tool in moving beyond site-specific management of TDG abatement efforts to a holistic, basinwide approach to the issue.
- Prioritize projects – future abatement alternatives will need to be prioritized based on several factors, including aquatic use. For example, reaches utilized by anadromous fish may be prioritized ahead of reaches utilized by resident fish.

Again, said Binkley, the goal of this chapter is to lay out some of the structural and operational gas abatement ideas that are being floated around in the region. Obviously, some reaches, such as the Lower Columbia, are well ahead of other reaches, such as the Flathead, in terms of their gas abatement planning and implementation.

One meeting participant suggested that, with the spring runoff season fast approaching, it may make sense to make direct contact with some of the projects on this list where no regular monitoring has taken place in the past, to encourage them to get some sort of monitoring program in place for 1999. There was general agreement that this would be a very positive step.

6. Recommendations About Future Actions and Next Steps.

Ruff noted several areas where additional effort is needed from the TGG membership as a whole:

- Everyone with project-specific monitoring information that is not currently included in the lists developed by the Monitoring and Information Sharing work group was asked to provide it to Faith Ruffing.
- A number of TGG participants (Mary Todd Uhlir, Keith Binkley, Andrea Ryan, Robert McDonald, Bev Raymond, Tom Foeller) agreed to work on a list of key data gaps in various study plan subsections. This group agreed to meet via conference call next week.
- The TGG needs to develop criteria to establish which dams are projects of concern, from an analytical priority standpoint.

Each of the work groups, beginning with Monitoring and Information Sharing, then described what they see as the next steps in developing their sections of the systemwide gas abatement study plan. Ruffing identified the following actions:

- Unless the additional information needed to complete the two tables in the Monitoring and Information Sharing section of the plan is readily available, Ruffing said the tables will stand more or less in their current form.
- The work group will be developing recommendations on the criteria to identify the projects of concern, to narrow the current list of potential projects included in the study from 140+ to a more manageable number.
- Between now and the next TGG meeting, the group will work to flesh out some of the subsections of their chapter, such as the QA/QC area, where information is lacking.
- The group will also begin to develop the comprehensive survey and review of all of the available physical monitoring and special study data on these dams.

Marshall Richmond identified the following next steps for the modeling work group:

- Work with the EPA office in Seattle to help avoid any duplication of effort between the EPA and Corps dissolved gas and water temperature modeling efforts
- Develop better time, cost and level-of-effort estimates for the development of systemwide gas production models of varying degrees of sophistication
- Coordinate with the other work groups to ensure that their modeling needs are being addressed.

Keith Binkley said the Structural and Operational work group's upcoming tasks include:

- Refine of the list of dams of concern, based on physical features, facilities and hydrology
- Circulate the criteria used to create the list of dams of concern for review by the group as a whole
- Begin to prioritize which dams to look at first, in terms of their gas abatement needs
- Provide input on operational recommendations to other forums, such as the TMT and Dissolved Gas Team.

Finally, Chris Pinney went over the next steps for the Biological Effects and Research work group:

- Investigate the added sections suggested at today's meeting, including physical injury.
- Incorporate additional comments received
- Finish the bibliography
- Develop a cost estimate for the biological effects research plan
- Find funding, develop the plan.

7. Next TGG Meeting and Agenda Items.

The next general meeting of the Transboundary Gas Group was set for Thursday, April 29, 1999, in Spokane, Washington. Meeting notes prepared by Jeff Kuechle, BPA contractor.

TRANSBOUNDARY GAS GROUP ATTENDANCE LIST
Seattle, Washington, February 18, 1999

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